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EXAMINER	
ZERVIGON, RUDY	

ART UNIT	PAPER NUMBER
1763	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application N .	Applicant(s)	
	09/722,485	NARUSHIMA, MASAKI	
	Examin r	Art Unit	
	Rudy Zervigon	1763	

-- The MAILING DATE of this communicati n appears n the cover sheet with th c rrespondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 15 May 2003 .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,2,4-6,9-13,17-22,26-28,30-32,36-44,51-69,75 and 76 is/are pending in the application.

4a) Of the above claim(s) 70-74 is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1,2,4,9-13,17-22,26-28,31,32,36-44,51-69,75 and 76 is/are rejected.

7)☒ Claim(s) 5,6 and 30 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Newly submitted claims 70-74 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 70-73 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Objections

2. Claims 5, 6, and 30 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claims, or amend the claims to place the claims in proper dependent form, or rewrite the claims in independent form. Claim 5 depends from canceled claim 3. Claim 6 depends from objected claim 5. Claim 30 depends from canceled claim 29.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1, 10, 12, 18, 31, 36-39, 43, 44, and 64-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Logan et al (USPat. 5,155,652). Logan et al teaches a ceramic heater

system comprising an upper heater base (124, Figure 3) partly, not integrally[1], formed of a ceramic material (column 3, lines 34-45; column 5, lines 26-32); and a lower heater base (130, Figure 3) formed of a ceramic material (column 3, lines 45-60; column 5, lines 26-32), the upper and lower heater bases forming a one-body heater base ("conducting electrical energy"; column 3, lines 46-53), with a lower surface of the upper heater base being in tight contact with the lower heater base once the components of the electrostatic chuck assembly (120) are assembled, the heater base (120, Figure 3 once assembled) including:

a mounting surface (122; Figure 3; column 2, lines 54-60 – boron nitride "isolation layer", column 3, lines 5-10) which is formed as an upper surface of the upper heater base (124, Figure 3 once assembled) and on which an object ("semiconductor wafer under process (not shown)") is mounted.

a metal (column 2, lines 58-63) heater (134 – column 3, lines 40-43; "heating layer", column 3, lines 46-53), buried in the upper heater base (124; Figure 3), for heating the object (column 3, lines 32-45),

a helium fluid passage (150; column 5, lines 15-25) provided in the lower surface of the lower heater base (130, Figure 3; column 5, lines 1-5) and formed as a groove through which a fluid is supplied toward the mounting surface,

wherein the heater base is cooled by causing a fluid (column 3, lines 59-65; column 4, lines 1-13) whose temperature is lower than a temperature of the lower heater base (column 4, lines 1-13) to be supplied through the fluid passage.

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[1] Integral – **3:** lacking nothing essential: ENTIRE – integrality , integrally. Merriam-Webster's Collegiate Dictionary - 10th Ed. p.607

Logan further teaches a ceramic (column 4, lines 41-48) heater system (Figure 1) comprising: a ceramic heater base (120, Figure 3; column 3, lines 32-53) formed of a ceramic material (column 4, lines 41-48). The heater base including a object ("product wafer (not shown)"; column 4, line 1) mounting surface formed on an upper surface (122, Figure 3) thereof; a heater winding (134, "heating pattern" Figure 3; column 3, lines 30-50), buried (column 4, lines 28-49) in the heater base for heating an object; and a fluid passage (150, Figure 3; column 3, lines 59-65) provided in the heater base (after bonding – column 4, lines 28-49) below the heater, whereby the heater base is cooled by causing a fluid (column 3, lines 59-65; column 4, lines 1-13) whose temperature is lower than a temperature of the heater base (column 4, lines 1-13) to be supplied through the fluid passage.

10. The ceramic heater system (120, Figure 3) according to claim 1, wherein the heater (134, Figure 3; column 3, lines 30-50) is formed of graphite (column 3, line 38) shaped in such a pattern as to evenly generate heat in the heater base.

12. The ceramic heater system (120, Figure 3) according to claim 1, further comprising: an electrode (126, Figure 3) buried in the heater base <u>and located between the heater (134) and the and the mounting surface (122; column 2, lines 54-57)</u>; and a DC power (column 2, line 65 – column 3, line 5) supply for applying a DC voltage to the electrode; whereby applying the DC voltage to the electrode causes the object mounted on the mounting surface to be electrostatically chucked.

Logan further teaches that the fluid passage has a fluid inlet and a fluid outlet (not shown, Figure 1) formed in a lower surface (140) of the lower heater base (130, column 3, lines 62-68) – "circulating a cooling fluid" requires an entrance and exit connected to a pump.

Logan does not teach a fluid passage provided in the lower surface of the upper heater base. Logan does not teach that the heater base is integrally (totally) formed of a ceramic material. In particular the only components that are not made of boron nitride (ceramic material) are the pattern layer (upper heater base) and the heat sink base (fluid passage; Figure 3). Logan also does not teach the ceramic heater system wherein the heater has a high-melting-point metal. Logan also does not teach a glassy boron nitride layer coated over Logan's graphite heater (134, column 3, lines 34-36) embedded in Logan's pyrolytic boron nitride (130, column 3, lines 32-35). Logan does not teach that the upper heater base and lower heater base are coupled together by a ceramic adhesive, however Logan does teach that the heat sink base (140) and the support (152) are coupled together by a ceramic adhesive (column 4, lines 28-45).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to extend the height of Logan's temperature controlling chambers 150 such that a fluid passage is provided in the lower surface of the upper heater base, and for Logan to manufacture his heat sink base (140) and pattern layer (124) of boron nitride or other ceramics (column 3, lines 13-15) and for Logan to replace his pyrolitic graphite material with a high-melting point metal material including fabricating Logan's substrate layer of boron nitride with a coating of glassy boron nitride thereover and bonding additional components of his ceramic heater with his ceramic adhesive.

Motivation to extend the height of Logan's temperature controlling chambers 150 such that a fluid passage is provided in the lower surface of the upper heater base is to further control heat transfer between Logan's ceramic heater layers as taught by Logan (column 2, lines 10-15). Further, it is well established that changes in apparatus dimensions are within the level of

ordinary skill in the art.(Gardner v. TEC Systems, Inc. , 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied , 469 U.S. 830, 225 USPQ 232 (1984); In re Rose , 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); See MPEP 2144.04).

Motivation for Logan to manufacture his heat sink base (140) and pattern layer (124) of boron nitride or other ceramics (column 3, lines 13-15) and for Logan to replace his pyrolitic graphite material with a high-melting point metal material including fabricating Logan's substrate layer 45 of boron nitride with a coating of glassy boron nitride thereover is to provide for alternate and equivalent material of construction and bonding including providing thermal expansion matching (column 4, lines 14-16).

5. Claims 2, 4, 11, 13, 17, 19, 28, 32, and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Logan et al (USPat. 5,155,652) in view of Manabu Edamura (JP407337630A)[2]. Logan is discussed above. Logan further teaches - 5. The ceramic heater wherein the fluid which flows in the fluid passage is at least one gas selected from Ar, He, Ne and N_2 gases or a mixed gas thereof (column 4, lines 1-13). Logan also teaches -¨11. The ceramic heater system according to claim 9, wherein the heater has glassy boron nitride (column 3, lines 32-40) coated on an outer surface of graphite of which the heater is formed (column 3, line 38). 5. - The ceramic heater wherein the fluid which flows in the fluid passage is at least one gas selected from Ar, He, Ne and N_2 gases or a mixed gas thereof (column 4, lines 5-10).

[2] Machine Translation from http://www1.ipdl.jpo.go.jp/PA1/cgi-bin/PA1DETAIL

Logan et al does not teach:

2. The ceramic heater system according to claim 1, wherein the fluid passage has a plurality of concentric circular passage portions and a plurality of penetration passage portions connecting the circular portions passage, and any adjacent two of the penetration passage portions are not aligned in a radial direction

4. The ceramic heater system, wherein the fluid passage has a fluid inlet formed in a central portion of a lower surface of the heater base and fluid outlets formed in outer circumference portions of the lower surface of the heater base.

6. Argon gas as a the heat transfer gas

11. a glassy boron nitride layer coated over Logan's graphite heater (134, column 3, lines 34-36) embedded in pyrolytic boron nitride (column 3, lines 32-35)

17. The ceramic heater system according to claim 1, wherein the fluid passage has a fluid inlet formed in a central portion of a lower surface of the heater base and a plurality of fluid outlets formed through circumferential side walls of the heater base.

19. a chamber whose interior can be kept in a vacuum state by and exhaust system and a heater base that is integrally formed of a ceramic material because Logan only teaches ceramic materials (boron nitride) for the heater base components of 122, 130 as discussed above. Logan teaches base 140 made from KOVAR and does not teach a specific material for component 124.

Manabu Edamura teaches a similarly cooled electrostatic chuck arrangement (Figures 1, 2, 7; abstract) including an electrostatic chuck (3, abstract): a fluid passage (7, abstract; Figure 7)

provided in the chuck base whereby the base is cooled by letting a fluid (helium and argon; abstract) to flow in the fluid passage further including:

2. An electrostatic chuck wherein the fluid passage has a plurality of concentric circular passage portions (7, abstract; Figure 7) and a plurality of penetration passage portions (3, abstract; Figure 7) connecting the circular portions passage – see Figure 7 and compare with Applicant's Figure 2.

4. fluid passages (7, Figure 1, 2, 7) with a fluid inlet (6, Figure 1,2) <u>formed in a central portion of</u> a lower <u>surface</u> of the heater base and fluid outlets (7, Figure 1,2) <u>formed in outer circumference portions of the lower surface</u> of the base.

5,6. The ceramic heater wherein the fluid which flows in the fluid passage is at least one gas selected from Ar and He (abstract).

17. fluid passages with a fluid inlet (6, Figure 2) formed in a central portion (6, Figure 2) of a lower surface of the heater base and a plurality of fluid outlets formed through circumferential side walls of the heater base – Figure 3 shows the pressure distribution across the back surface of the wafer. The pressure is shown at 10Torr at the center ([Example]) and drops to 5mTorr (the chamber pressure, [Example]). As a result of the pressure gradient from the center to the edge of the back surface, a flow of coolant is established.

19. a chamber (1) whose interior can be kept in a vacuum state (5mTorr [Example]) by and exhaust system (2) and a heater base (3)

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Logan to replace his heat sink base with Manabu Edamura's heat sink base made of ceramic

material, and for Logan to replace his pyrolitic graphite material with a high-melting point metal material including fabricating Logan's substrate layer of boron nitride with a coating of glassy boron nitride thereover.

Motivation for Logan to replace his heat sink base with Manabu Edamura's heat sink base made of ceramic material is to provide for uniform heating or cooling of the semiconductor wafer as taught by Manabu Edamura (abstract).

Motivation for Logan to replace his pyrolitic graphite material with a high-melting point metal material including fabricating Logan's substrate layer of boron nitride with a coating of glassy boron nitride thereover is to provide alternate and equivalent material of construction.

6. Claims 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over unpatentable over Logan et al (USPat. 5,155,652) and Manabu Edamura (JP407337630A) in view of Ameen et al (USPat. 6,143,128). Both Logan and Manabu Edamura are discussed above. Logan further teaches, in a separate embodiment (Figure 1), a lower electrode (50; column 3, lines 1-5) in the heater base (40, Figure 1; column 3, lines 32-53) and located between an upper surface (42) of the heater base and a heater (60). However, Logan and Manabu Edamura do not teach a showerhead fed by a process-gas supply mechanism. Manabu Edamura and Logan each do not teach an RF powered showerhead that is electrically isolated. Ameen teaches a similar plasma processing apparatus (Figure 1; column 5, line 66 – column 6, line 30) including a showerhead (61) fed by a process-gas supply mechanism (11). Ameen teaches an RF powered showerhead that is electrically isolated (column 7, lines 9-26, 33-44). Ameen further teaches an etching gas (21, 22, 29; Figure 1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Ameen's electrically isolated RF powered showerhead and process-gas supply mechanism to Manabu Edamura's processing apparatus including adding a lower electrode to Manabu Edamura's second embodiment (Figure 3).

Motivation to add Ameen's electrically isolated RF powered showerhead and process-gas supply mechanism to Manabu Edamura's processing apparatus including adding a lower electrode to Manabu Edamura's second embodiment (Figure 3) is to evenly distribute the process gases over the substrate and to provide additional heating.

7. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Logan et al (USPat. 5,155,652) in view of Fuji et al (USPat. 6,135,052). Logan is discussed above. Logan et al does not teach means for temperature adjustment of the fluid coolant from a heat exchanger when controlling wafer temperature. Fuji et al teaches wafer temperature control with a temperature controller (12, Figure 1) for a predetermined temperature of a fluid coolant by a heat exchanger (item 4, Figure 1; claim 1; column 2, lines 47-52), configured to either remove or add heat, thereby imparting temperature control of a wafer. Fuji et al also teaches a showerhead with associated process gas supply (column 3, lines 60-65).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Logan's coolant fluid sources with Fuji's coolant fluid sources including wafer temperature control means for temperature adjustment of the fluid coolant.

Motivation to replace Logan's coolant fluid sources with Fuji's coolant fluid sources including wafer temperature control means for temperature adjustment of the fluid coolant is to provide for wafer temperature control during processing as taught by Fuji (column 2, lines 39-46).

8. Claims 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Logan et al (USPat. 5,155,652). Logan is discussed above. However, Logan does not teach the temperature of the coolant fluid supplied to the heater base (140, Figure 3; column 3, lines 32-53) as being between 10 and 800°C.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Logan to provide the coolant fluid provided to the heater to have a temperature as being between 10 and 800°C.

Motivation for Logan to provide the coolant fluid provided to the heater to have a temperature as being between 10 and 800°C is to optimize the heat removed from the wafer as taught by Logan (column 4, lines 5-13). Further, it would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele , 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); Merck & Co. Inc . v. Biocraft Laboratories Inc. , 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied , 493 U.S. 975 (1989); In re Kulling , 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05).

9. Claims 26, 27, 51, 53, 62, and 68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Logan et al (USPat. 5,155,652) in view of Steger et al (USPat. 5,788,799). Logan is discussed above. Logan further teaches an oxide-based metallic material ("alumina"; column 3, line 15 – Al_2O_3). However, Logan does not teach aluminum nitride (AlN) as an alternate ceramic material. Steger teaches ceramic liner materials (claim 6) for plasma facing chamber components (column 7,lines 41-65).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Logan to replace his boron nitride component materials with aluminum nitride as taught by Steger.

Motivation for Logan to replace his boron nitride component materials with aluminum nitride as taught by Steger is to provide alternate and equivalent materials of construction as taught by Steger (claims 2, 6, and 10).

10. Claims 41, 63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Logan et al (USPat. 5,155,652) in view of Whitaker et al (USPat. 4,622,687). Logan is discussed above. However, Logan does not teach his fluid passage having an increased surface area thereby providing an improved heat transfer (heating/cooling efficiency). Whitaker teaches a heat transfer fluid conduit (43, Figure 2, 2A) with an increased surface area (surface roughness; column 18, line 68 – column 19, line 2) thereby providing an improved heat transfer (heating/cooling efficiency).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Logan to roughen the internal surface area of the fluid conduit as taught by Whitaker.

Motivation for Logan to roughen the internal surface area of the fluid conduit is to provide an improved heat transfer as taught by Whitaker (column 18, line 68 – column 19, line 2).

11. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Logan et al (USPat. 5,155,652) and Whitaker et al (USPat. 4,622,687) in view of Randlett et al (USPat.5,415,225). Logan and Whitaker are discussed above. Logan and Whitaker do not teach heat radiating/absorbing fins in the fluid passages. Randlett teaches a heat exchange tube (60, Figure 9) including a first internal surface (14) with heat exchange fins (column 7, lines 4-34).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Logan and Whitaker to add heat exchange fins as taught by Randlett in the coolant flow conduit of the ceramic heater system.

Motivation for Logan and Whitaker to add heat exchange fins as taught by Randlett in the coolant flow conduit of the ceramic heater system is to enhance the heat exchange efficiency as taught by Randlett.

12. Claim 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over Logan et al (USPat. 5,155,652) and Steger et al (USPat. 5,788,799) in view of Manabu Edamura (JP407337630A). Logan and Steger are discussed above. Logan and Steger do not teach the fluid passage has a fluid inlet formed in a central portion of a lower surface of the heater base and fluid outlets formed in outer circumference portions of the lower surface of the heater base.

Manabu Edamura teaches a similarly cooled electrostatic chuck arrangement (Figures 1, 2, 7; abstract) including an electrostatic chuck (3, abstract): a fluid passage (7, abstract; Figure 7) provided in the chuck base whereby the base is cooled by letting a fluid (helium and argon; abstract) to flow in the fluid passage further including fluid passages (7, Figure 1, 2, 7) with a fluid inlet (6, Figure 1,2) formed in a central portion of a lower surface of the heater base and fluid outlets (7, Figure 1,2) formed in outer circumference portions of the lower surface of the base.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Logan to replace his heat sink base with Manabu Edamura's heat sink base including fluid passages a fluid inlet formed in a central portion of a lower surface of the heater base and fluid outlets formed in outer circumference portions of the lower surface of the base.

Motivation for Logan to replace his heat sink base with Manabu Edamura's heat sink base is to impart a desired temperature distribution as taught by Manabu Edamura (Problems to be solved by the invention – see translation).

13. Claim 54 is rejected under 35 U.S.C. 103(a) as being unpatentable over Logan et al (USPat. 5,155,652) and Steger et al (USPat. 5,788,799) in view of Whitaker et al (USPat. 4,622,687). Logan and Steger are discussed above. However, Logan and Steger do not teach a fluid passage having an increased surface area thereby providing an improved heat transfer (heating/cooling efficiency). Whitaker teaches a heat transfer fluid conduit (43, Figure 2, 2A) with an increased surface area (surface roughness; column 18, line 68 – column 19, line 2) thereby providing an improved heat transfer (heating/cooling efficiency).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to roughen the internal surface area of for Logan and Steger's the fluid conduit as taught by Whitaker.

Motivation to roughen the internal surface area of for Logan and Steger's the fluid conduit as taught by Whitaker is to provide an improved heat transfer as taught by Whitaker (column 18, line 68 – column 19, line 2).

14. Claim 55 is rejected under 35 U.S.C. 103(a) as being unpatentable over Logan et al (USPat. 5,155,652) and Steger et al (USPat. 5,788,799) in view of Randlett et al (USPat. 5,415,225). Logan and Steger are discussed above. Logan and Steger do not teach heat radiating/absorbing fins in the fluid passages. Randlett teaches a heat exchange tube (60, Figure 9) including a first internal surface (14) with heat exchange fins (column 7, lines 4-34).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Logan and Steger to add heat exchange fins as taught by Randlett in the coolant flow conduit of the ceramic heater system.

Motivation for Logan and Steger to add heat exchange fins as taught by Randlett in the coolant flow conduit of the ceramic heater system is to enhance the heat exchange efficiency as taught by Randlett.

15. Claims 9, 56, 58, 61, and 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Logan et al (USPat. 5,155,652) in view of Arai et al (JP07272837 A). Logan is discussed above. Logan does not teach heater formed in a coil form. Arai teaches a similar ceramic heater (Title; Figures 1,2) including a heater (2; Figure 1a) formed in a coil form.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to shape Logan's heater in a coil form as taught by Arai.

Motivation to shape Logan's heater in a coil form as taught by Arai is to provide uniform temperature distribution (Constitution).

16. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Logan et al (USPat. 5,155,652) and Arai et al (JP07272837 A) in view of Manabu Edamura (JP407337630A). Logan and Arai are discussed above. Logan and Arai do not teach the fluid passage has a fluid inlet formed in a central portion of a lower surface of the heater base and fluid outlets formed in outer circumference portions of the lower surface of the heater base.

Manabu Edamura teaches a similarly cooled electrostatic chuck arrangement (Figures 1, 2, 7; abstract) including an electrostatic chuck (3, abstract): a fluid passage (7, abstract; Figure 7) provided in the chuck base whereby the base is cooled by letting a fluid (helium and argon;

abstract) to flow in the fluid passage further including fluid passages (7, Figure 1, 2, 7) with a fluid inlet (6, Figure 1,2) formed in a central portion of a lower surface of the heater base and fluid outlets (7, Figure 1,2) formed in outer circumference portions of the lower surface of the base.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Logan and Arai to replace the heat sink base with Manabu Edamura's heat sink base including fluid passages a fluid inlet formed in a central portion of a lower surface of the heater base and fluid outlets formed in outer circumference portions of the lower surface of the base.

Motivation for Logan and Arai to replace the heat sink base with Manabu Edamura's heat sink base is to impart a desired temperature distribution as taught by Manabu Edamura (Problems to be solved by the invention – see translation).

17. Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Logan et al (USPat. 5,155,652) and Arai et al (JP07272837 A) in view of Whitaker et al (USPat. 4,622,687). Logan and Arai are discussed above. However, Logan and Arai do not teach his fluid passage having an increased surface area thereby providing an improved heat transfer (heating/cooling efficiency). Whitaker teaches a heat transfer fluid conduit (43, Figure 2, 2A) with an increased surface area (surface roughness; column 18, line 68 – column 19, line 2) thereby providing an improved heat transfer (heating/cooling efficiency).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to roughen the internal surface area of for Logan and Arai's fluid conduit as taught by Whitaker.

Motivation to roughen the internal surface area of for Logan and Arai's fluid conduit as taught by Whitaker is to provide an improved heat transfer as taught by Whitaker (column 18, line 68 – column 19, line 2).

18. Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Logan et al (USPat. 5,155,652) and Arai et al (JP07272837 A) in view of Randlett et al (USPat.5,415,225). Logan and Arai are discussed above. Logan and Arai do not teach heat radiating/absorbing fins in the fluid passages. Randlett teaches a heat exchange tube (60, Figure 9) including a first internal surface (14) with heat exchange fins (column 7, lines 4-34).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Logan and Arai to add heat exchange fins as taught by Randlett in the coolant flow conduit of the ceramic heater system.

Motivation for Logan and Arai to add heat exchange fins as taught by Randlett in the coolant flow conduit of the ceramic heater system is to enhance the heat exchange efficiency as taught by Randlett.

19. Claim 75 is rejected under 35 U.S.C. 103(a) as being unpatentable over Logan et al (USPat. 5,155,652) and Arai et al (JP07272837 A) in view of Beaudoin et al (USPat. 3,911,386). Logan and Arai are discussed above. Logan and Arai do not teach the material for a high-melting point metal electrode is one of tungsten (W), molybdenum (Mo), and platinum (Pt). Beaudoin teaches the material for a high-melting point metal electrode (14; Figure 1) is made from platinum (abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to manufacture Logan and Arai's metal electrode from platinum as taught by Beaudoin.

Motivation to manufacture Logan and Arai's metal electrode from platinum as taught by Beaudoin is to operate Logan and Arai's metal electrode at elevated temperatures as taught by Beaudoin (column 2, lines 26-30).

20. Claim 76 is rejected under 35 U.S.C. 103(a) as being unpatentable over Logan et al (USPat. 5,155,652) in view of Beaudoin et al (USPat. 3,911,386). Logan is discussed above. Logan does not teach the material for a high-melting point metal electrode is one of tungsten (W), molybdenum (Mo), and platinum (Pt). Beaudoin teaches the material for a high-melting point metal electrode (14; Figure 1) is made from platinum (abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to manufacture Logan's metal electrode from platinum as taught by Beaudoin.

Motivation to manufacture Logan's metal electrode from platinum as taught by Beaudoin is to operate Logan and Arai's metal electrode at elevated temperatures as taught by Beaudoin (column 2, lines 26-30).

Response to Arguments

21. Applicant's arguments filed May 15, 2003 have been fully considered but they are not persuasive.

22. In response to Applicant's position that Logan does not teach a heater base integrally formed of a ceramic material, the Examiner agrees. However, it is the Examiner's opinion (see above) that Logan provides proper motivation for selecting alternative materials for his heater

(see above). It is further agreed that Logan's KOVAR material is not a ceramic and is an alloy metal as stated by Logan.

23. In response to Applicant's position that Logan does not teach "forming a one-body heater base", it is noted that Logan's discussion and Figures represent component parts of Logan's Heater base (120, Figure 3) that are ultimately fused to from "a one-body heater base" (column 4, lines 14-49).

24. Regarding Applicant's position that "Edamura does not teach or suggest that the stage includes a ceramic material", and that Edamura's similarly cooled electrostatic chuck arrangement (Figures 1, 2, 7; abstract) does not have a heating capability, it is stated above that Manabu Edamura's electrostatic chuck arrangement (Figures 1, 2, 7; abstract) includes an electrostatic chuck (3, abstract): a fluid passage (7, abstract; Figure 7) provided in the chuck base. Additionally, the base can be either cooled, or heated, depending on the temperature of the circulating fluid, by letting the fluid (helium and argon; abstract) to flow in the fluid passage. As such, Edamura is not cited to demonstrate a stage made of a ceramic material, the motivation of which is provided by Logan (see above). A similar response is provided with reference to Witaker who is not cited for heating a wafer and for a heater base as is provided by Logan (see above).

Conclusion

25. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (703) 305-1351. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official after final fax phone number for the 1763 art unit is (703) 872-9311. The official before final fax phone number for the 1763 art unit is (703) 872-9310. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (703) 308-0661. If the examiner can not be reached please contact the examiner's supervisor, Gregory L. Mills, at (703) 308-1633.

JEFFRIE R. LUND
PRIMARY EXAMINER